JUMBO BINS

OWNERS MANUAL

jumbo bin
PACKING FOR PROFIT

mpact®

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SECTION 1

INTRODUCTION

High pressure injection-moulded Jumbo Bins have been designed specifically to overcome the many shortcomings of wood bins and other forms of previously available plastic bins, such as those made from low pressure mouldings, such as rotationally cast bins and structural foam bins. Jumbo Bins are moulded from Polypropylene (PP).

To achieve the maximum benefit from the use of the Jumbo Bins®, it is important to recognise the differences between plastic and wood bins and to handle and utilize the bins accordingly. A simple training programme, prior to the use of plastic bins, for those employees who directly handle your bins, such as forklift drivers and field supervisors, is strongly advised in order to enjoy to the maximum, the benefits offered by the Jumbo Bin.

This guide will review important issues in the use of plastic bins. The information is current as of date of publication but is subject to change. Any further questions can be directed to:

Mpact Plastic Containers at (021) 573 9400

SPECIAL ATTENTION SHOULD BE GIVEN TO THE FOLLOWING SECTIONS:

3.	Transportation (Especially the way the bins are tied down on a truck)
4.	Storage (Especially when empty)
5.	Handling equipment (Forklift handling)
6.	Packing house equipment (Especially bin tippers, stackers and de-stackers)

SECTION 2

BIN USAGE

The Jumbo Bin has been designed specifically for the harvesting, processing and storage of fruit, vegetables and other types of agricultural products. All Jumbo Bins are manufactured from FDA (Food and Drug Administration) regulated food-approved materials.

It is important that Jumbo Bins are used in accordance with the design specifications, which are outlined in the Product Specification Sheets (see appendix 1).

It is important to check the compatibility of PP to prolonged exposure to certain chemicals. A Chemical Resistance Chart has been prepared by CMOSA for use in determining the suitability in use of Jumbo Bins for certain applications.

In general, the following must be observed:

- **Heavy objects** should not be dropped onto the floor of the bin as they could damage the floor.
- **Holes should not be drilled** in Jumbo bins, as any modifications to bins will void the warranty.
- Jumbo Bins must not be stacked when the corner post section of the bin has been **damaged.**
- Jumbo Bins must **not be pushed** off trucks onto concrete or other hard surfaces.
- Jumbo Bins should be **periodically inspected** for structural damage to the corner posts and upper ribs. This is very important in applications where bins are stacked, as the corner posts have been designed to bear most of the load when the bins are stored in a stack.
- Any major cuts or cracks to the corner posts may cause structural collapse in a stack. Based on this inspection, bins should then be sent in for recycling or repaired. Bins with **repaired corner posts** should be used only in **non-stacking applications.**
- **Do not** interstack wood bins with Jumbo Bins.

SECTION 3

TRANSPORTATION

Jumbo Bins are much lighter than wood bins and because the feet interlock, they form a more stable block when tied together on a truck and trailer. The plastic material they are made from is smoother than wood so they tend to slide more in transport. Provisions must be made to prevent bins from sliding backward and forward as well as for sliding from side to side.

A. Bin Movement – Forward/Backward

The force of the wind hitting the front stack of bins tends to force the load on a trailer to the rear possibly forcing the last row of bins at the rear of the trailer off the back.

A quick stop may also cause the bins to slide forward.

Strapping may not be sufficient to effectively control this problem and it is recommended that the following be done in addition to strapping down:

- Weld stops on the front and rear of all trailers to prevent bins from sliding forward or back.

- The addition of an approved bulkhead wall at the front of the trailer to prevent forward movement of the load would be advisable as a safety provision if a wall is not already in place.

- In the absence of these provisions it is recommended that pillars be used in place of the welded stops. Pillars should be placed at the front and rear ends of the trailer.

B. Bin Movement from Side to Side

As trailers are pulled down the highway they can sway from side to side creating the potential for side-drift of the bins.

Hard cornering and high winds further contribute to this problem increasing the probability of side drift.

To prevent this problem, the following is recommended:

Effective cross-tying with ropes or straps will prevent bins from moving in any direction. Optimum results are achieved with straps and winches but suitable rope can be used in cases where trailers are not equipped with winches.

Cross-tying of wood bins is done by running the strap or rope across the centre of each bin. This is not recommended with Jumbo Bins as the centre post is not designed for this type of force.

As the strap or rope is tightened, the side walls will be forced inward and deformed. This deformation is not permanent, provided excessive force is avoided, and the bin will return to normal within 24 hours.

Nevertheless, cross-tying in this manner is not recommended since it is difficult to control the force exerted and the procedure which follows is recommended:

To avoid cross-tying of Jumbo Bins on the centre post, “V-boards” should be used to connect two bins at the upper corners, thereby bridging the space between them and creating a surface over which the rope or strap can be draped.

This method is preferred since the greater strength of the corner posts are better able to sustain over-tensioning of the cross-tie. It also allows two stacks of bins to be safely secured using one Cross-tie.

C. Bin Loading on Trailers

The following procedure should be adhered to when loading bins on to trailers:

1. On trailers without "stops" at the front and rear of the trailers, pillars should be put in place before loading. Pillars should be placed at both ends of each of the trailers.

2. Load the bins starting at the pillar end of the trailer with the first stacks placed tight up against the pillar. It is important to pack the load as tight as possible as the load will tend to settle together in the first few kilometers of travel, causing slack in the strapping. For this reason, it is imperative that the straps be checked for proper tension and tightened if needed after the first 10 kilometers of travel.

3. Place the "V-boards" on top, spanning 2 bins so that the strapping can be draped over the area between 2 stacks.

Tie-down over "V-boards" placed across the corner columns of two stacks

4. The strapping should then be sufficiently tightened. The strap should not be as tight as is required with wood bins, but enough to securely hold down the load. Over-tightening the straps may cause deformation of the corner posts so care must be taken when tightening straps. For best results, straps and winches should be used to cross-tie but rope can be used when this is not possible.

5. After about 10 kilometers of travel on the road, the load **must** be checked to ensure that it is still secure, and if needed, the straps should be tightened again. The bins may shift and be forced closer together after being driven on the highway, causing slack on the straps.

NOTE: It is imperative that tie-down methods implemented comply with local authority regulations governing bin hauling. It is the responsibility of the user to ensure they are in compliance with these regulations. **This is a very important step and must not be neglected.**

D. Nesting

Jumbo Bins can be transported on trucks or trailers in the normal manner or can be nested. Nesting enables three bins to be transported in the space of two.

Nesting Procedure

The following procedure should be followed when nesting bins:

Step 1. Nest a bin on its side and slide another bin into it as shown.

Step 2. Right the 2 bins, keeping them nested together then lift a third bin upside down and place it over the lower 2 bins. A stack of 2 nested sets of bins can then easily be prepared for loading onto a flatbed trailer or for storage.

Step 1

Step 2

***Nested** - 3 in the space of 2*

Denesting Procedure is the reverse of the nesting procedure.

SECTION 4

STORAGE

A. Outdoor

Because Jumbo Bins incorporate a state-of-the-art ultra-violet (UV) stabiliser, outdoor storage is perfectly acceptable.

B. Maximum Capacity and Stack Weight Limits

Jumbo bins have been designed to perform within specific maximum load capacities and stacking tolerances. For capacity and stack weight limits for Jumbo Bins, please refer to Mpact Plastic Containers Jumbo Bin's Product Specification Sheets. Appendix 1.

C. Stack Height Empty

When stacking more than 4 high, they should be stored in blocks of several stacks. This is to avoid the bins being blown over by high winds.

General Rule: The higher the stack, the wider the block.

As a safety precaution, when bins are stacked higher than 4 high, they should be located in an area away from personnel activity. As an extra precaution against high winds, diagonal cross-bracing, using the hand-held area to hold strapping hooks is advised.

Diagonal cross-bracing

D. Interstacking

It is essential to ensure that load stresses are transferred in the designed manner in a stack of bins.

To achieve this, Jumbo Bins have been designed with a patented interlocking foot which ensures the proper bearing of loads. Under no circumstances must Jumbo Bins be interstacked with wood bins or other manufacturers' plastic bins.

It is imperative that bins are stacked with the foot sides lined up from the bottom to the top of the stack.

E. Temperature Ranges

The following temperature limits apply to Jumbo Bins:

	Low	High
Polypropylene	-30°C	77°C

Please refer to the product specification sheets for additional details on the use and stacking of Jumbo Bins at various temperature levels.

Great care should be taken when using the Jumbo Bin at the high and low limit.

Normal operating conditions for the Jumbo Bin are set at:
Between 0°C and 34°C.

SECTION 5

HANDLING EQUIPMENT

Forklift Handling

Plastic bins are smoother than wood so they will slide on forks. When transporting Jumbo Bins on forklift trucks, travel in reverse with the forks tilted back.

Attaching rubber or other non-skid material to the top of forklift forks will also help to prevent bins from sliding.

Travel in reverse with forks titled back

- Since Jumbo Bins are approximately 45% lighter than wood bins, it is imperative that forklift drivers take this into account when handling.
  A combination of the lighter weight and stacking capabilities creates a stack that, with careless handling on a forklift, is prone to tipping over.

- Care must be taken when cornering and traveling over rough surfaces with empty bins as they can easily tip and be dropped.

- To prevent a stack from falling when it starts to tip, the forks should be lowered so that the bottom bin feet slide along the ground and the forklift should be stopped. This will stabilise the stack so it can be lifted up and moved again. Under no circumstances should bins be moved by sliding them along the ground, as this will cause premature wear of the feet.

- The radiuses entry of Jumbo Bins permits considerable misjudgement of height on the part of the driver. It is thus inevitable that the radius will be frequently struck by the tips of the forks.

TO REDUCE WEAR AND TEAR ON THE RADIUSED ENTRY OF JUMBO BINS, IT IS IMPORTANT THAT THE FORKLIFT TIPS ARE FREE FROM BURRS AND SHARP EDGES ON THEIR UPPER SURFACE.

A little time spent on these areas will be generously repaid in longer bin life.

Bin Trailers

Most bin trailers require no modifications to handle Jumbo Bins. Modification is required when the tops of the rollers are below the level of the top of the frame. This may cause the bin foot to rest on the frame instead of the rollers, thus preventing the bin from easily rolling off the trailer. In such cases, the rollers must be raised to a point where the top of the roller clears the top of the frame. This will allow the bin to roll freely. Depending on the height, the rollers must be raised.

This can be done by either:

1. Removing the rollers and adding a sleeve to increase the roller diameter.

2. Re-drilling the frame and raising each roller to clear the frame.

SECTION 6

PACKING HOUSE EQUIPMENT

De-stackers

Most de-stacking equipment will handle the Jumbo Bins with little or no major modifications. In some cases, it is advisable to cut a bevel into the leading edge of the lifting dog and to extend them slightly. This is necessary to accommodate the rounded forklift entry area of Jumbo Bins. It is also advisable to adjust the present guides or to add guides to insure that the bin is centered between the lifting dogs before being raised. The best way to test the compatibility of Jumbo Bins with your equipment is to fill some bins with product and run them through. If there are any problems, they will become obvious.

Stackers

As with de-stackers, most stacking equipment will run Jumbo Bins with little or no modifications. Running bins through the equipment will quickly bring out any problems.

Floaters

Jumbo Bins have easily run through all floaters that they have been tested in. Jumbo Bins have the added bonus of plastic construction allowing them to be immersed indefinitely with virtually no negative effects to the bin.

Pre-Sizing Lines

Jumbo Bins have been tested in a number of pre-sizing lines with no problems.

Bin Tippers

Bin tippers should be rotated 140 degrees from resting position to ensure the removal of all fruit from the bin. This may require some modification to some tippers.

Pallet Jacks

The Jumbo Bin is not designed to be used with standard hand pallet jacks when fully loaded. If this is required, it is recommended that low profile pallet jacks with a maximum collapsed height of 65mm are used. For further information, please contact your local sales representative.

SECTION 7

BIN IDENTIFICATION

A variety of options are available for marking bins for identification.

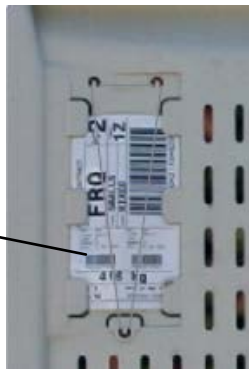
The following methods are currently used:

1. **Foil Embossing:** Foil embossing is the most attractive method available for the marking of Jumbo Bins. This requires a heated press which can apply a coloured logo to the recessed panels on the front and rear centre posts. Thus, it has to be done at the factory prior to delivery. A variety of colours are available.

Foil embossed

2. **Branding:** An electrically heated cattle brand can also be purchased to brand the bin. The branding iron is heated and pressed into the bin leaving an indented mark. This method is effective but not as attractive as the foil embossing and must be done by the customer.

3. **Label Holders:** Jumbo Bins have been equipped with a label holder that will accommodate a card with a maximum size of 10 x 22 cm, eliminating the problems associated with staples on wooden bins.



Label holder for bin tickets

4. **Painting:** PP cannot be painted successfully.

SECTION 8

MAINTENANCE

One of the major benefits of the Jumbo Bin is the lack of maintenance required to keep them in good condition, as compared with wood bins which require constant, expensive repairs. High pressure moulded PP is a tough, resilient material that will withstand a great deal of use, provided that they are not abused.

Cleaning

Bins can easily be cleaned using high pressure washers with fine spray and mild soap. **Under no circumstances should steam cleaners be used to clean bins, as the high temperatures used will damage the bin.**

Foot Replacement

Feet on the Jumbo Bins are replaceable. In the event of severe damage or extreme wear, the foot can be replaced either at the factory or by the user.

Method of replacement is as follows:-

1. Care must be taken not to damage the bin body when removing a worn or damaged foot.
2. When fitting the replacement foot, it is important to ensure that the locking lugs are securely engaged before the bin is used.

Repair of Damaged Panels

Panels can be repaired utilizing a hot air welder. The hot air welder can be used to repair cracked side panels and bottom panels but is not recommended for repair of major damage to the corner posts.

Bins with major damage to the corner posts should either be sent back for recycling or repaired and limited to use in non-stacking applications.

A hot air welding guide is included in this document in section 9.

SECTION 9

HOT AIR WELDING REPAIRS

- Hot air welding of Polypropylene (PP) is a relatively easy process to learn. It shares only the name and a few technical characteristics with metal welding. Do not think in terms of metal welding when performing plastic welds as they require very different techniques.

- The following guidelines on welding Jumbo Bin containers refer only to the welding of the eight flat panels on the sides of a Jumbo Bin.

- Specifically excluded from welding or any repair if damaged are the four corner posts or the underside of the bin.

- Furthermore, welding the Jumbo Bin, other than in accordance with this guide, may void its warranty.

- It is exclusively the responsibility of the owner to ascertain and determine whether or not the structural integrity of the container will be affected in his application.

- Mpact Plastic Containers Ltd encourages its customers to get as much value from their bins as possible.

- One of the ways Mpact offers exceptional value is through a bin recycling programme. This option should be considered if the bin is badly damaged. Contact your sales person for details.

- It is important that only food grade PP welding rod is used. Using non-food grade rod will preclude Mpact from recycling your bin. Mpact will ask you to certify that only food grade materials have been used to repair your bin.

WELDING EQUIPMENT

To weld PP the following items are needed:

1. Hot air welder.
2. Welding or filler rod.
3. High Speed Welding Tip.
4. Small Paint scraper or equivalent.
5. “Sureform” shaver tool used to smooth rough Bondo on auto body work.
6. Side cutter pliers.

Because welding requires a certain amount of skill, it is highly recommended that practice welds be performed on scrap plastic before welding the Jumbo Bin surface.

WELDING PROCEDURE

1. Clean the area to be welded.

2. Using the paint scraper or equivalent tool, cut a V-groove along the crack to be welded. This important step removes oxidized plastic that could inhibit welding.

3. Tack-weld pieces to be welded if needed. In most cases, this will not be necessary when welding panels.

4. Make sure correct Polypropylene rod is used. It will be white in colour. Other colour rods are for different materials and will not provide a proper weld. Cut a welding rod at a 60 degree angle to start the weld.

5. Start the welder by setting the temperature to 300 degrees C. (500 degrees F).

6. Feed the cut end of the rod into the speed tip after warming the crack where you will start the weld. (Do not melt the plastic).

7. When the tip of the rod starts to become clear, place it onto the start of the crack in the bin.

8. Slowly pull the welder along the crack, feeding the rod with your other hand.

9. After about 3 cm of welding rod has been applied, let go of the rod. The rod will now feed automatically and both hands can be used to handle the welder until the weld is completed.

10. At the end of the weld, lift the welder and slide the remaining rod through the speed tip.

11. Turn the welder temperature to its lowest setting letting it run until the speed tip has cooled down. This is extremely important as the tip will become brittle and crack if the welder is shut off immediately.

12. When the weld has cooled, cut the excess rod and let the weld set for 30 minutes to cure before testing.

13. At this point the scraper can be used to smooth the welded surface.

14. For optimum results when repairing the bin side wall, this procedure should be repeated on the opposite side of the weld.

USEFUL HINTS

1. The rod should keep its round shape as the weld is performed. Soften it until it merges with the base material. Do not mush or puddle it.

2. Welding rod should be cut to the length of the weld. Do not stretch the rod.

3. A properly performed weld is stronger than the base material.

4. Using solvents for cleaning may soften the edges and cause poor welds.

5. A good weld will have a fine bead along each side of the rod.

6. If the welder temperature is too hot or the welder is moved too slowly along the crack, the bead will be wide and irregular, resulting in a poor weld.

7. If the welder temperature is too low or the welder is moved too quickly along the crack, a bead will not form and a poor weld will result.

8. Use the following weld photographs to check your welds.

9. When damaged, the bin side panels are frequently buckled and hard to keep flat during the welding process. To keep the panels flat, a steel plate should be prepared with clearance holes for 10 mm bolts that will line up with the vents on the side panels. The plate should be located on the reverse side of the panel to be welded, locating the bolts in such a manner as to flatten the area around the crack. Use flat washers on bolts to flatten the plastic panel against the plate. This will flatten the area around the crack and create a solid base to more easily prepare and weld the crack.

There are many hot air welders on the market.

Mpact Plastic Containers recommends the HG 2000 E and the AGR 6000EL.

The major advantages of the HG 2000 E are the ability to set the air temperature, speed welding tip, and its robust construction.

The HG 2000 E can be purchased from:

P M Distributors
P O Box 1093
Kraaifontein
7569
Tel: (021) 987 2727

They will also provide technical assistance for any welding problems you experience. Make sure you specify Mpact approved welding rod when ordering.

HG 2000 E Electronic Hot Air Gun (includes high speed welding tip): R896, 00 excl. VAT.

The other items needed, can be purchased at any hardware store.
Prices are given as a guide only and are subject to change without noticed. Please contact the Vendor for current pricing.

DISCLAIMER:

MPACT PLASTIC CONTAINERS MAKES NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE FOREGOING MODIFICATIONS, INCLUDING, WITHOUT LIMITATION, THEIR DESIGN, SUITABILITY OF FITNESS FOR ANY PARTICULAR PURPOSE, QUALITY OF MATERIAL OR WORKMANSHIP OR DURABILITY, AND HEREBY SPECIFICALLY DISCLAIMS ANY SUCH WARRANTY. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, MPACT PLASTIC CONTAINERS SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY DEFECTS, EITHER PATENT OF LATENT (WHETHER OR NOT DISCOVERABLE), IN ANY OF SUCH MODIFICATIONS OR THE MODIFIED EQUIPMENT, OR FOR ANY DIRECT OR INDIRECT DAMAGE TO PERSONS OR PROPERTY RESULTING THEREFROM, OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING STRICT OR ABSOLUTE LIABILITY IN TORT), OR FOR USER'S LOSS OF USE OF ANY OF THE MODIFIED EQUIPMENT OR FOR ANY INTERRUPTION IN USER'S BUSINESS CAUSED BY USER'S INABILITY TO USE ANY OF THE MODIFIED EQUIPMENT FOR ANY REASON WHATSOEVER.

Section 10

Mpact Plastic Container

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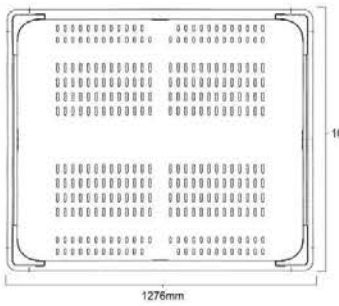
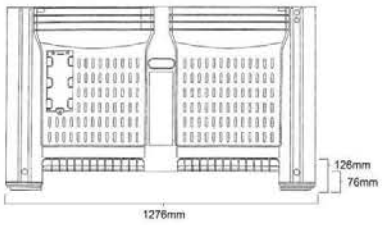
SPECIFICATIONS

SA packers now have the opportunity to compete with worldwide competitors who have already switched to plastic bulk bins. The **"Packing for Profit" Jumbo bin** improves pack-out quality and carries with it measurable financial benefits.

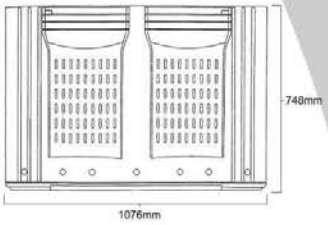
Top view



Front View



Side View



Features and Benefits

- Rounded corners and smoother interior surfaces results in less bruising and damage to your produce.
- Multiple vents in sides and base provide superior air flow so products cool faster adding valuable shelf-life to your produce.
- Unique design with rounded entry has a larger forklift entry height than wooden bins.
- Smooth, non-absorbent surface is not affected by dipping operations. The design is compatible with most bin handling equipment.
- Unqiue moulded label holders for cards and tags. Small, exterior pads reduce scratches.
- Easy, clear ownership identification with hot foil stamping.
- Comfortable handholds are built in for easy lifting and handling of bins.
- The positive interlocking foot design permits fast and safe stacking.

Bin Capacity

Up to 500 kg

784 Litres

Tare Weight

Vented 37 kg
Solid 38.5 kg

Moulding process

High pressure injection moulding.

Materials

UV-stabilised impact modified polypropylene. Fully recyclable.

Container Construction

Double walled corner and centre posts. Two label holders and two hand holds for lifting.

Foot design

Positive interlocking with two feet.

Fork lift entry

126 mm opening with patented slide entry.

Ventilation slots

804 air vents located in side panels and floor facilitate air flow.

All air vents have rounded surfaces on the inside. Vent opening 8 mm.

Stacking

- 4700 kg on level ground in cold storage.
- 3800 kg on level ground in temperatures less than 35 degree C for less than 1 month.
- 3400 kg on level ground at temperatures less than 35 degree C for more than 1 month.

Dimensions

Overall external size:
1276mm x 1076mm

Height: 748 mm

Internal size:
Maximum: 1267mm x 1067 mm
(at externalised panels)
Minimum: 1196 mm x 996 mm
(at top rim)

Depth: 617 mm

Variations

- The Jumbo Bin is available with solid walls and base.
- Vent opening: 5mm instead of 8mm.

Options

- Easy identification with hot foil stamping, or moulded logo.
- Bar coding.
- RF tagging.

Industry Applications: vented and unvented bins: Citrus, Pôme, Stone Fruit, Sub-tropical Fruit, Vegetables, Wine Grapes, Nuts, Canning. And also: fishing, food processing, merchandising and general industries.

Linpac Materials Handling (SA) (PTY) LTD, Neil Hare Road, Atlantis, Western Cape 7350
Tel: +27 21 577 1205 Fax: +27 21 577 3399 email: sales.sa@linpac-materialshandling.com

LINPAC

jumbo bin
PACKING FOR PROFIT

Appendix 2

POLYPROPYLENE

TECHNICAL INFORMATION
TI-KTE / PN-15 D
81063 (769) MAY 1986
registered trademark

RESISTANCE TO CHEMICALS

Polypropylene's resistance to chemicals is determined by the covalent characteristics of polypropylene.

Polypropylene is resistant to several covalent liquids including alcohols, organic acids, ethers and ketones. Swelling is observed when Polypropylene comes into contact with aliphatic and aromatic hydrocarbon and halogenated hydrocarbon. This impairs the strength. Once the liquid causing the swelling has evaporated, original characteristics are to a large extent reinstalled.

Polypropylene is resistant to hydrous solutions of inorganic salts and to almost all inorganic acids and alkalines, which includes high concentrations of the above at temperatures exceeding 60°C. However, oxidising substances e.g. chlorosulfonated acid, oleum, concentrated nitric acid and halogens affect Polypropylene even at ambient temperatures.

It should be emphasised that Polypropylene with special characteristics (extraction-stable high-temperature-resistant-stabilisation..11, third fourth digit in the type designation) has an excellent resistant to standard washing agents at temperatures up to 100°C.

No tension cracks in Polypropylene caused by chemicals have yet been observed.

Polypropylene causes gases and aliphatic / aromatic hydrocarbons with low boiling points and chlorinated hydrocarbons to diffuse to a certain extent.

The results of various tests conducted with reference to DIN 53476 are summarised in the following table. Results were determined by subjecting compressed test samples of 1mm thickness to the listed substances under no-load conditions for a period of 30 days. Results were taken into consideration if experiences over longer testing periods were available. Changes in weight after 30 days testing period with testing substances were determined followed by tensile tests as per DIN 53455 with swollen samples to assess the resistance.

This table may only be used as a guideline to determine the suitability of formed parts made of Polypropylene because as resistance to chemicals depends on the shape of the product and subsequent stress conditions. In most cases field tests are absolutely essential.

Abbreviations used in the table:

Cold sat. = cold saturated

s = measured value,
Boiling point of test substance

w = hydrous solution

The following symbols were used for the resistance:

+ = resistance

Negligible swelling

Irrelevant changes in yield stress

± = fairly resistant

Slight swelling

Reduced yield stress

Under critical conditions, conduct tests and determined suitability

- = non resistant

Excessive swelling

Considerably impaired yield stress

Strain or stress over a short period may be possible

Missing symbols mean that in terms of stated conditions no tests were conducted.

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
Chemicals				
Acetone	100	+	+(s)	
Acrylonitrile	100	+		
Alumen, all types	w.any	+	+	
Allyl alcohol	w.96	+	+	
Aluminium salts	w.any	+	+	+
Formic acid	w.98	+	±	
Formic acid	w.85	+	±	
Formic acid	w.50	+	±	
Formic acid	w.10	+	+	
Ammonia, liquid	100	+		
Ammonia, gaseous	100	+	+	
Ammonia	w.30	+	+	
Ammonia	w.10	+	+	
Ammonium acetate	w.any	+	+	+
Ammonium carbonate	w.any	+	+	+
Ammonium chloride	w.any	+	+	+
Nitrate of ammonium	w.any	+	+	+
Ammonium phosphate	w.any	+	+	+
Ammonium sulphate	100	+	+	
Amyl alcohol	100	±		
Aniline				
Anisole				
Barium salts	w.any	+	+	
Benzaldehyde	100	+		
Benzaldehyde	w.cold saturated	+		
Benzoic acid	100	+	+	
Benzoic acid	w.cold saturated	+	+	+
Benzene	100	±	-	
Benzyl alcohol	100	+	±	
Succinic acid	w.cold saturated	+	+	
Borax	w.cold saturated	+	+	
Boric acid	100	+	+	
Boric acid	w.cold saturated	+		
Bromine, liquid	100	-		
Bromine vapours	high	-		
Bromine vapours	low	±	-	
Bromine water	cold saturated	-		
Hydrobromic acid	50	+		
Butane, liquid	100	+		
Butane, gaseous	100	+	+	
1,4-butane diol	100	+	+	
butane diol	100	+	+	
n-butanol	100	+		
butyl glycol	100	+		

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
calcium carbonate	w.cold saturated	+	+	+
calcium chloride	w.cold saturated	+	+	+
chlorinated lime	w.any	+	+	
calcium nitrate	w.cold saturated	+	+	
chlorine, liquids	100	-		
chlorine, gaseous, humid	10	±	-	
chlorine,gaseous,dry	100	-		
chlorobenzene	100	±	-	
chloroacetic acid	100	+		
chloroform	100	±	-	
chlorosulphonic acid	100	-		
chlorine water	cold saturated	±	-	
hydrogen chloride, gaseous	any	+	+	
chromous salts (bivalent and trivalent)	w.cold saturated	+	+	
chromium trioxide (chromic acid)	w.cold saturated	+	-	
chromium trioxide	w.20	+	±	
cyclo hexane	100	±		
cyclo hexanol	100	+	±	
cyclo hexanone	100	+	-	
decahydronaphthalene	100	±	-	
diethyl ether	100	±		
dispropyl ether	100	±	-	
dimethyl formamide	100	+		
1,4-dioxan	100	±	±	-
ferrous salts	w.cold saturated	+	+	+
acetic acid (crystallisable acetic acid)	100	+	±	-
acetic acid	w.10	+	+	+
acetic acid	w.50	+	+	
acetic acidamyl acetate	100	±	-	
acetic anyhyride	100	+		
acetic butyl ether (butyl acetate)	100	±	-	
ethyl acetate (acetic ether)	100	±	±	

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
methyl acetate	100	+	+(s)	
ethyl alcohol	100	+		
ethyl alcohol	w.96	+	+	
ethyl alcohol	w.50	+	+	
ethyl alcohol	w.10	+	+	
ethyl benzene	100	±	-	
ethyl chloride	100	-(s)		
ethylene chloride	100	±		
2-ethyl hexanol	100	+		
hydrofluoric acid	40	+	+	
formaldehyde	w.40	+	+	
formaldehyde	w.30	+	+	
formaldehyde	w.10	+	+	
fructose	w.cold saturated	+	+	+
glucose	w.cold saturated	+	+	+
glycerin	100	+	+	+
glycerin	w.any	+	+	+
glycols	100	+	+	+
glycols	w.any	+	+	+
carbamide	w.cold saturated	+	+	
n-heptane	100	±	±	
n-hexane	100	±	±	
isooctane	100	±	±	
isopropyl alcohol	100	+	+	
caustic potash solution	50	+	+	
	25	+	+	
caustic potash solution	10	+	+	
caustic potash solution	w.cold saturated	+	+	
potassium carbonate (potsh)	w.cold saturated	+	+	
potassium chlorate	w.cold saturated	+	+	+
potassium chloride	w.cold saturated	+	+	+
potassium dichromat	w.cold saturated	+	+	
potassium iodate	w.cold saturated	+	+	
potassium nitrate	w.cold saturated	+	+	
potassium permanganate	w.cold saturated	+	+	
potassium persulphate	w.cold saturated	+	+	
potassium sulphate	100	+	±	
cresylic acid	w.cold saturated	+	+	
crysylic acid				
cuprous salts				

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
magnesium salts	w. cold saturated	+	+	+
menthol	100	+		
methyl alcohol (methanol)	100	+	+(s)	
methyl alcohol	w.50	+	+	
methylic chloride	100	±		
methyl ethyl ketone	100	+	±	
lactric acid	w.90	+	+	
lactric acid	w.50	+	+	
lactric acid	w.10	+	+	
morpholine	100	+	+	+
naphthalene	100	+		
sodium acetate	w.cold saturated	+	+	+
sodium bisulphite	w.cold saturated	+	+	
sodium carbonate	w.cold saturated	+	+	
sodium carbonate	w.10	+	+	+
sodium chlorate	w.25	+	+	
sodium chloride (table salt)	w.cold saturated	+	+	+
sodium hydrogen	w.5	+		
carbonate (bicarbonate)	w.cold saturated	+	+	+
sodium hydroxide (caustic soda)	100	+	+	
sodium hypochlorite	w.13	+	+	
sodium nitrate	w.cold saturated	+	+	
sodium nitrite	w.cold saturated	+		
sodium perborate	w.cold saturated	+	+	+
sodium phosphate	w.cold saturated	+	+	+
sodium sulphate	w.cold saturated	+	+	+
sodium sulphide	w.cold saturated	+	+	
sodium sulphite	w.cold saturated	+	+	
sodium thiosulphate (fixing salt)	w.cold saturated	+	+	
caustic soda lye	50	+	+	
caustic soda lye	25	+	+	
caustic soda lye	10	+	+	+
nickelsalts	w.cold saturated	+	+	
nitrobenzene	100	+	±	
oleic acid	100	+	±	
oxalic acid	w.cold saturated	+	±	
ozone (0,5 ppm)		+		

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
tetrachloroethylene				
s. tetrachloroethylene				
phenol	100	+	+	
phenol	w. cold saturated	+	+	
phosphorous oxychloride	100	+	±	
phosphorous pentoxide	100	+		
phosphoric acid	85	+	+	
phosphoric acid	50	+	+	
phosphoric acid	10	+	+	+
phosphoric acid	100	+		
phosphorous trichloride	w.50	+	+	
phthalic acid	100	+		
propane, liquid	100	+	+	
propane, gaseous	w.50	+	+	
propionic acid	100	+	+	
propylene dycols	100	±	±	
pyridine				
mercury	100	+	+	
mercury salts	w.cold saturated	+	+	
nitric acid	68	-	-	
nitric acid	50	±	-	
nitric acid	25	+	±	
nitric acid	10	+	+	
hydrochloric acid	36	+	+	
hydrochloric acid	10	+	+	
sulphur	100	+	+	+
sulphur dioxide	any	+	+	
carbon bisulphide	100	±		
sulphuric acid	98	±	-	
sulphuric acid	85	+	±	
sulphuric acid	50	+	+	
sulphuric acid	10	+	+	+
hydrogen sulphide	w. low	+	+	
silver salt	w.cold saturated	+	+	
stearic acid	100	+		
tetrachloroethane	100	±	-	
tetrachloroethylene (perchloroethylene)	100	±	-	
carbon tetrachloride	100	-		
tetrahydrofurane	100	±	-	
tetrahydronaphthalene	100	±	-	
thiophene	100	±	-	
toluol	100	±	-	

trichloroethylene		±		

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
water	100	+	+	
hydrogen peroxide	30	+	±	
hydrogen peroxide	10	+	+	
hydrogen peroxide	3	+	+	
tartaric acid	w. cold saturated	+	+	
xylene	100	±	-	
zinc salts	w.cold saturated	+	+	
tin (ii)-chloride	w.cold saturated	+	+	
citric acid	w.cold saturated	+	+	+
Consumer goods (technical) pharmaceutics, cosmetics				
acronal-dispersion		+		
battery acid		+	+	
asphalt *		+	±	
aspirin		+		
straight-run gasoline		±	-	
mineral turpentine		±	-	
gasoline, normal		±	-	
gasoline, super		±	-	
beeswax		+	±	
bleaching lye (12,5% active chlorine)		+	±	
floor polish *		+	±	
brake fluid *		+	+	
chloride of lime (hydrous slurry)		+	+	
chrome baths, techn. *		+	+	
chromosulphuric acid		-		
dextrin	w. cold saturated	+		
diesel oil		±		
fatty alcohol sulphonate		+		
fir leaf oil		+	+	

*** Resistance depends on the composition**

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
fixing salt	any	+	+	
Frigen 113		-		
antifreeze (motor vehicles)		+	+	+
dishwashing liquid *	standard	+		
	ready-made	+	+	+
shampoo *		+	+	
heavy (heating) fuel *		±	±	
tincture of iodine		+		
kerosene		±	±	
fir leaf oil		+	+	
bone oil		+	+	
nitrohydrochloric acid		±	-	
Lanolin (wool fat)		+	±	
Linseed oil		+	+	
Lysol		+	±	
mineral oils (without aromatic compounds) *		+	±	-
furniture polish *		+	±	-
engine oils (motor vehicles) *		+	±	-
nail varnish *		+	±	
nail varnish remover *		+	±	
oleum	any	-		
paraffin		+	+	-
paraffin oil		+	±	-
perfume		+		
petroleum ether		±	±	
petroleum		±	±	
photographic developer	standard ready-made	+	+	

*** Resistance depends on the composition**

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
sagrotan		+	±	
soft soap		+	+	
shoe polish *		+	±	
soap, soap bars		+	+	
soap suds		+	+	
silicone oils *		+	+	+
tar *		+	±	
turpentine		±	-	
ink		+	+	
transformer oil *		+	±	
vaseline		+	±	
washing powder	standard ready-made	+ +	+	+
water glass softener		+	+	
dibutylphthalate (Palatinol c)		+		
disononylphthalate (Palatinol dn)		+		
dioctyladipate (Plastomoll doa)		+		
dioctylphthalate (Palatinol AH)		+		
tricresylphosphate		+		
trioctylphsophate		+		
toothpaste		+	+	
Food and drinks				
pineapple juice		+	+	
apple sauce		+	+	+
apple juice		+	+	
orange juice		+	+	
orange peel		+		
orange peel oil		+		
beer		+		
bitter almond essence		+		
butter		+	+	
buttermilk		+		

*** Resistance depends on the composition**

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°c	60°c	100°c
cola drinks		+		
peanut oil		+	+	±
vinegar	standard	+	+	
pickled fish		+	+	+
fruit juices		+	+	
gelatin	w. any	+	+	
jelly		+	+	+
vegetable		+	+	+
gin		+		
grape juice		+	+	
yeast	w.any	+		
honey		+	+	
cheese		+		
coffee (beans and ground)		+		
coffee, instant		+	+	+
cocoa, powder		+		
cocoa, instant		+	+	+
mashed potatoes		+	+	
potato salad		+		
coconut oil		+	+	
cake		+	+	+
cod liver oil		+		
liqueurs	any	+		
lemonades		+		
maize oil		+		
liqueurs		+		
lemonades				
maize oil		+	±	
margarine		+	+	
jam		+	+	+
mayonnaise		+		
horse radish, ready to serve		+		
flour		+		
milk		+	+	+
dishes containing milk		+	+	+
mineral water		+	+	+

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
gloves (spice)		+		
oil of gloves		+	±	
fruit salad		+		
olive oil		+	+	
palm kernel oil		+	±	
red pepper (spice)		+		
pectin	w.cold saturated	+	+	
pepper		+		
peppermint oil		+		
pudding		+	+	+
cream cheese		+		
beef suet		+	+	
rum		+	+	
rum essence		+		
cream, whipped cream		+		
salt, dry		+	+	+
pickled herrings		+		
brine	any	+	+	+
pickled white cabbage		+	+	+
ready-to-serve lard		+	+	±
mustard		+		
soda water		+		
soya oil		+	±	
salad oil (vegetable)		+	±	
salad oil (animal)		+	±	
starch, starch solution	w. any	+		
tea, instant		+	+	+
tea leaves		+	+	
tomato sauce		+	+	
tomato juice		+	+	
vanilla		+		
wine, punch		+	+	
brandy		+		
whisky		+		
sausage		+	+	

SUBSTANCE	CONCENTRATION %	HOMOPOLYMER BLOCK COPOLYMER RANDOM COPOLYMER		
		20°C	60°C	100°C
cinnamon		+		
lemon essence		+		
lemon juice		+	+	
lemon peel		+		
lemon peel oil		+		
sugar, dry	w.any	+	+	+
sugar solutions		+	+	+
sugar beet syrup		+	+	+

PLEASE NOTE:

Details given herein are based on present knowledge and experience. They do not exonerate the processor from undertaking tests and examinations, due to the multitude of influences possibly having an effect on our products during the processing stage or during application. Legally binding guarantees concerning certain properties or suitability for a specific purpose may not be deduced from details in force must be observed by the recipient of our products, at his own responsibility.